PRACTICAL CENTRE

B-14, Block 1, Gulshan-e-Iqbal, Karachi. Phone: 34976530-34817547-34984762

[Comprehensive Examination - 2023]

According to the syllabus & new pattern of the Board of Intermediate Education, Karachi

CHEMISTRY (XII)

Time: 3 Hours *Max. Marks: 85*

SECTION 'A' MULTIPLE CHOICE QUESTIONS (MCQs) (MARKS-17)

Note: (i) Attempt all the questions (ii) Do not copy the questions. Write only the answers on OMR sheet.
(iii) Each question carries *ONE* mark.

Q. 1 Choose the correct answer for each from the given options:

(i) The elements of a same group in the periodic table having:
(a) same atomic numbers (b) same mass numbers
(c) same number of neutrons (d) same valence shell configuration

(ii) $CH_3OH_{(l)} + H_2O_{(g)} \xrightarrow{250°C} 3H_2 + A$. In the given reaction, "A" is:
(a) C (b) CO (c) CO_2 (d) CO_3^{2-}

(iii) $NaBH_4$ is an example of:
(a) Ionic hydrides (b) Covalent hydrides (c) Complex hydrides (d) Metallic hydrides.

(iv) When Lithium burn in air it forms Lithium:
(a) Normal oxide (b) Peroxide (c) Super oxide (d) Hydroxide

(v) The H-S-H bond angle in H_2S is:
(a) 92.2° (b) 92.3° (c) 92.4° (d) 92.5°

(vi) Aluminium is passive towards concentrated
(a) Nitric acid (b) Sulphuric acid (c) Acetic acid (d) Phosphoric acid

(vii) The coordination number of Chromium in $[Cr(S_2O_3)_3]^{-3}$ is:
(a) 2 (b) 3 (c) 5 (d) 6

(viii) Zinc is a transition element, but it does not show variable oxidation state because:
(a) It does not form coloured compound (b) It has incomplete d-sub shell
(c) It has completely filled d-sub shell (d) It has two electrons in the outer most shell

(ix) Ethanol and Methoxy methane are best considered:
(a) Position isomers (b) Chain isomers (c) Metamers (d) Functional group isomers

(x) This is used as anti knocking agent:
(a) $Pb(CH_3)_2$ (b) $Pb(C_2H_5)_2$ (c) $Pb(CH_3)_4$ (d) $Pb(C_2H_5)_4$

(xi) This is ortho-para directing group:
(a) $-NO_2$ (b) $-NH_2$ (c) - CHO (d) - COOH

(xii) When Sodium acetate reacts with Soda lime, it forms Sodium carbonate and:
(a) CO_2 (b) CH_3COOH (c) CH_3OH (d) CH_4

(xiii) When Methyl magnesium iodide reacts with Formaldehyde, it gives:
(a) Ethane (b) Ethene (c) Ethanol (d) Acetic acid

(xiv) It is used as a preservating agent for biological specimen:
(a) Methanol (b) Ethanol (c) Acetaldehyde (d) Formalin

(xv) A dipolar charged but overall an electrically neutral-ion is called:
(a) Zwitter ion (b) Carbonium ion (c) Hydronium ion (d) Oxonium ion

(xvi) The making of design on glass surface by using HF is called:
(a) Galvanizing (b) Bleaching (c) Etching (d) Silvering of glass

(xvii) When Carboxylic acid reacts with alcohol, it produces a new class of compound called:
(a) Ether (b) Ester (c) Amide (d) Acid halides

Contd. Page 2...

SECTION "B" (SHORT ANSWER QUESTIONS) (36-Marks)

NOTE: Attempt Any **NINE** questions. Atleast **FOUR** questions from **INORGANIC CHEMISTRY** and **FOUR** questions from **ORGANIC CHEMISTRY**. All questions carry equal marks.

INORGANIC CHEMISTRY

Q. 2(i) Refer to the list of given compounds:

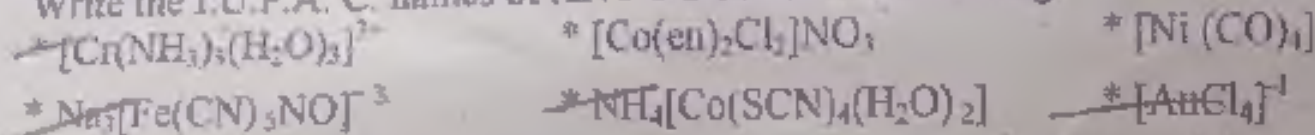
Compound	A	B	C	D
Specific Name	Epsom salt	Carnallite	Sandhur	Hypo

* Write equation for the action of AgBr on D. * Write any one use of A.
* Write the equation for the preparation of C. * Write the formulae of A and B.

(ii) Define periods and groups. Give the valence shell configuration of the following:
* Alkali metals and Coinage metals * Group IV-A and IV-B

OR

(a) State the following: * Döbereiner's law of Triads * Newland's Law of Octaves
(b) Identify the block, group and period of elements having atomic number:
* 29 * 34

(iii) Write the I.U.P.A. C. names of **ANY FOUR** of the following:
* $[Cr(NH_3)_3(H_2O)_3]^{3+}$ * $[Co(en)_2Cl_2]NO_3$ * $[Ni(CO)_4]$
* $Na_3[Fe(CN)_5NO]^{-3}$ * $NH_4[Co(SCN)_4(H_2O)_2]$ * $[AuCl_4]^{-1}$

(iv) (a) Write two methods for the preparation of Water gas.
(b) Give the reaction of Atomic Hydrogen with: * Oxygen * Silver chloride

(v) Give the preparation of Chlorine gas by Nelson cell.

OR

What is matte? How is blister Copper obtained from matte?

(vi) Give the scientific reasons for **ANY FOUR** of the following:
* Alkaline earth metals are strongly hydrated than alkali metals.
* Atomic hydrogen is more reactive than molecular hydrogen.
* Plastic sulphur is elastic in nature.
* Li/Li^+ has exceptionally high electrode potential.
* H_2O and NH_3 act as ligand but H_3O^+ and NH_4^- do not.
* Boric acid is soft and slippery.
* Zinc hydroxide is soluble in excess of Sodium hydroxide.
* Graphite conducts electricity while diamond does not.

OR

What are isotopes? Explain the different isotopes of Hydrogen.

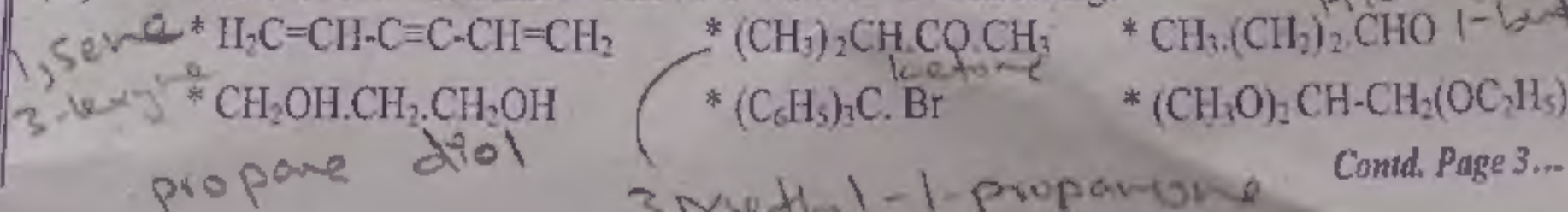
(vii) Write the balanced chemical equations for **ANY FOUR** of the following reactions:
* Coleminite reacts with soda ash. *Soda ash is fused with silica.
* Carbon reacts with conc. Sulphuric acid. *Super heated water reacts with Boron nitride.
* Aluminium reacts with conc. Sulphuric acid. *Phosphorus reacts with Conc. Nitric acid.
* Carbon monoxide reacts with Chlorine gas. *Saturated solution of Soda ash with Carbon dioxide.
* Chromium oxide reacts with Potassium hydroxide and Bromine water.

OR

Describe **ANY TWO** of the following general properties of d-block elements:
* Interstitial Compounds * Magnetic properties * Colour * Catalytic properties

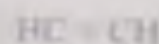
ORGANIC CHEMISTRY

(viii) Define **ANY FOUR** of the following:
* Rancidification * Peptide bond * Metamerism * Glycosidic linkage
* Catenation * Polymerization * Saponification * Homologous series

(ix) Write I.U.P.A.C. names of **ANY FOUR** of the following:
* $H_2C=CH-C\equiv C-CH=CH_2$ * $(CH_3)_2CH.CO.CH_3$ * $CH_3.(CH_2)_2.CHO$
* $CH_2OH.CH_2.CH_2OH$ * $(C_6H_5)_3C.Br$ * $(CH_3O)_2CH-CH_2(OC_2H_5)$

Contd. Page 3...

(x) Draw hybrid orbital structure of Ethylene. How are the following compounds obtained from Ethylene? * Mustard gas * Ethylene glycol

OR

Consider the following structure and answer the following questions:

$HC \equiv CH$ (A) (B)

* Draw the hybrid orbital structure of A.
* Write the equations for the conversion of B into Maleic anhydride.
* Give equation for the preparation of B from A.

(xi) Give stepwise mechanism of Nitration **OR** Chlorination in Benzene.

(xii) How could you prepare **ANY FOUR** of the following compounds?

* Ter-butyl alcohol from Grignard reagent
* Oxalic acid from Acetylene
* Oxime from Formaldehyde
* Ethane from Chloro ethane
* Nylon-6, 6 from Adipic acid
* Vinegar from Grignard reagent

(xiii) Distinguish **ANY TWO** of the following compound by simple chemical test:

* Formaldehyde and Acetone
* Ethane and Ethyl chloride
* 1-Butyne and 2-Butyne
* n-Hexane and Benzene

(xiv) Give the classification of Organic compounds.

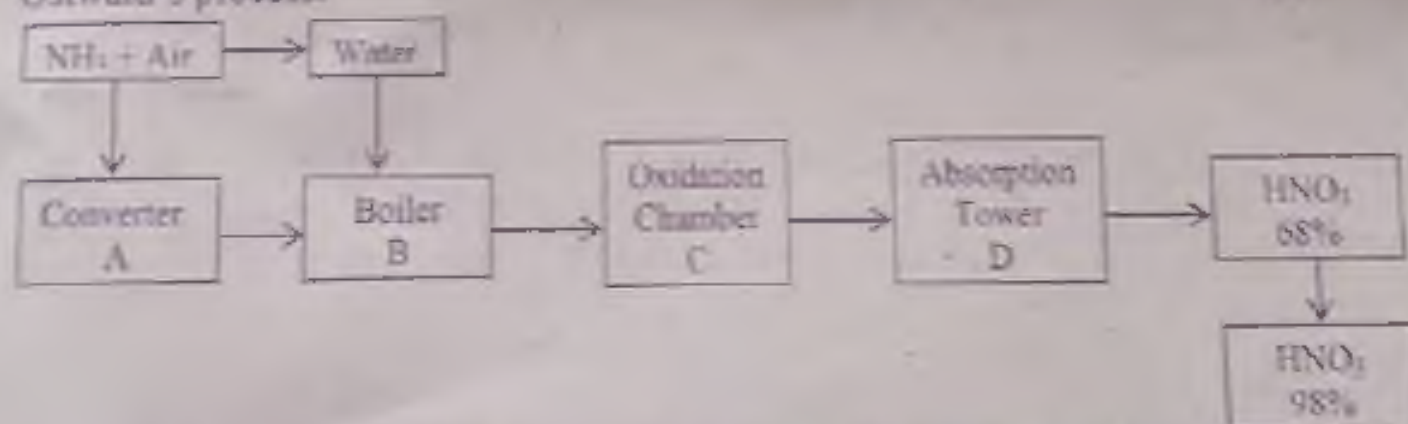
OR

Write only the equations for the following reactions:

* Wurtz reaction * Cannizzaro reaction * Williamson's synthesis * Dow's process

SECTION "C" (DETAILED ANSWERS QUESTIONS) (32–MARKS)

Note: Attempt Any **TWO** questions. **ONE** question from **INORGANIC CHEMISTRY** and **ONE** question from **ORGANIC CHEMISTRY**. Both questions carry equal marks.

Q.3(a) The flow chart represents stages in the manufacture of Nitric acid (HNO_3) by Ostwald's process. (6)

* Explain the process in 'A' along with conditions for maximum conversion.
* Describe the process in 'C' and 'D'.
* How is 98% HNO_3 obtained?
* Draw the structure of Nitric acid in vapour phase.

OR

Give the manufacturing of Sulphuric acid by Contact process. Also mention the conditions to get maximum yield of SO_3. Draw flow sheet diagram.

(b) How is Caustic soda manufactured by Castner-Kellner cell? Write the advantages and disadvantages of Castner-Kellner cell. (Diagram is not required) (5)

OR

How is Soda-ash manufactured by Ammonia - Solvay's process? (Flow-sheet diagram is not required)

(c) State Modern periodic law. Describe the types of elements in the periodic table based on electronic configuration. (5)

OR

Write only the equations, when the following compounds are heated:

*Potassium permanganate *Blue stone *Lunar caustic *Gypsum *Ortho boric acid

Contd. Page 4...

Q.4 (a) What is metallurgy? How is 99.99 % pure Aluminium obtained from Bauxite ore containing SiO_2 as major impurities? (6)

(b) Complete and balance **ANY FIVE** of the following equations: (5)

- $K_2MnO_4 + Cl_2 \longrightarrow$
- $Al + NaOH + H_2O \longrightarrow$
- $FeO.Cr_2O_3 + K_2CO_3 + O_2 \longrightarrow$
- $FeCl_3 + H_2S \longrightarrow$
- $K_2Cr_2O_7 + KCl + H_2SO_4 \longrightarrow$
- $HCOOH + H_2SO_4 \longrightarrow$
- $AgNO_3 + NH_3 \longrightarrow$
- $CuSO_4 + KI \longrightarrow$
- $K_2CrO_4 + H_2SO_4 \longrightarrow$
- $Sb_2S_3 + HCl \longrightarrow$

(c) Write short notes on **ANY TWO** of the following: (5)

* Lead Pigments * Bleaching powder * Extraction of Sodium metal
* Corrosion and its prevention * Silvering of mirror * Crystalline forms of Sulphur

<u>OR</u>

What are hydrides? Give their classification? Explain Ionic hydrides.

ORGANIC CHEMISTRY

Q. 5 (a) Explain the structure of Benzene by Molecular Orbital Treatment. Also discuss the stability of Benzene. (6)

<u>OR</u>

Describe the structure of Benzene suggested by Kekulé. What are the objections against it? How were these objection removed?

(b) Give the structures of **ANY FIVE** of the following: (5)

* Catechol * Nicotin amide * Diphenyl acetylene
* Picric acid * Valeric acid * Iso-butyl alcohol
* Terephthalic acid * Di-isopropyl ether * α,β - dimethyl butyraldehyde

(c) What is photochemical reaction? Explain the mechanism with the example of Chlorination of Methane (5)

Q. 6(a) Give the classification of Monohaloalkanes. Explain the following reactions with mechanism when: (6)

(i) NaCN reacts with 2-chloro-2-methyl propane

(i) NaOH reacts with chloro ethane.

<u>OR</u>

What is fermentation? How is Ethanol prepared by the fermentation of Molasses and Starch? Write the composition of Rectified spirit and Denatured alcohol.

(b) Complete and balance **ANY FIVE** of the following reactions: (5)

(i) $H_3C-\overset{\overset{O}{||}}{C}-OH \xrightarrow[500^\circ C]{MnO_2}$

(ii) $H-\overset{\overset{O}{||}}{C}-H \xrightarrow{\text{Polymerization}}$

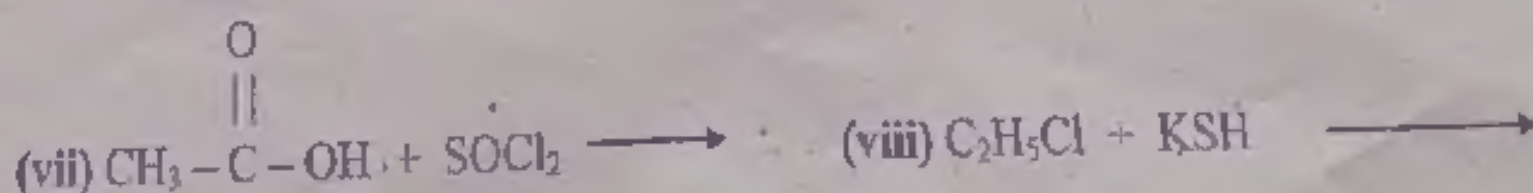
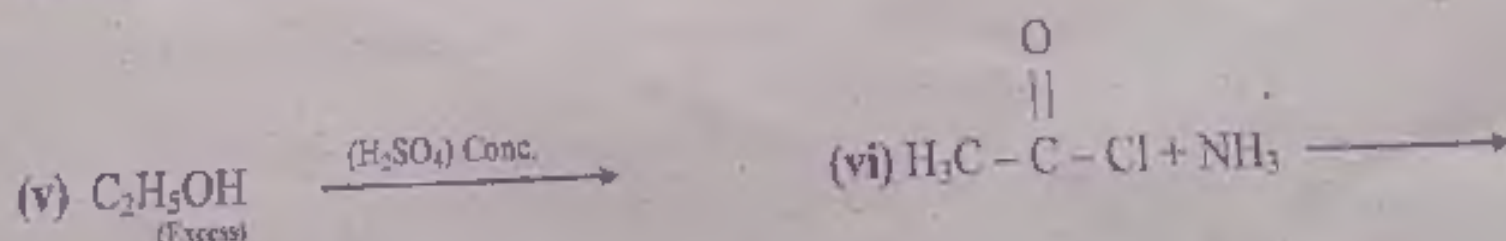
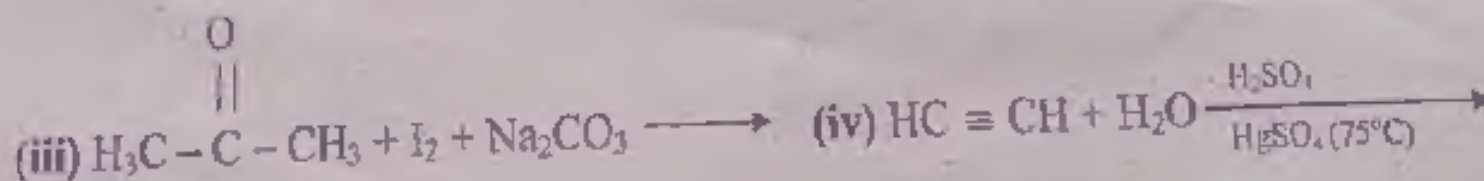
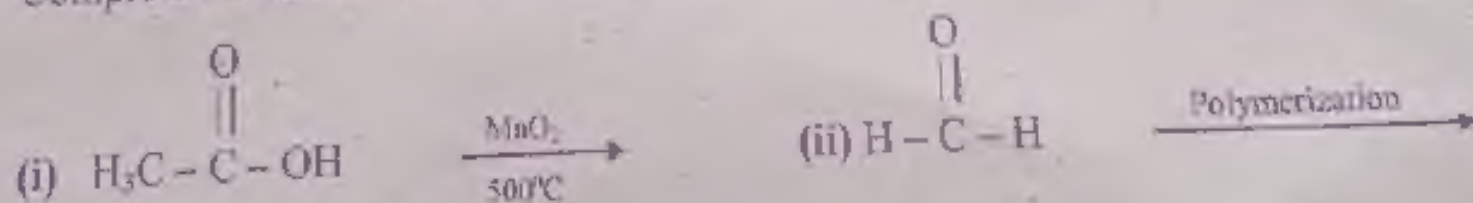
(iii) $H_3C-\overset{\overset{O}{||}}{C}-CH_3 + I_2 + Na_2CO_3 \longrightarrow$

(iv) $HC\equiv CH + H_2O \xrightarrow[HgSO_4\,(75^\circ C)]{H_2SO_4}$

(v) $\underset{(Excess)}{C_2H_5OH} \xrightarrow{(H_2SO_4)\ Conc.}$

(vi) $H_3C-\overset{\overset{O}{||}}{C}-Cl + NH_3 \longrightarrow$

(vii) $CH_3-\overset{\overset{O}{||}}{C}-OH + SOCl_2 \longrightarrow$

(viii) $C_2H_5Cl + KSH \longrightarrow$

(c) Write short notes on **ANY TWO** of the following: (5)

* Fertilizers * Plastics * Elimination reactions
* Carbohydrates * Vitamins * Amino acids

(iii) Write the I.U.P.A.C. names of ANY FOUR of the following:
* [Cr(NH3)3(H2O)3]3+
* [Co(en)2Cl2]NO3
* [Ni (CO)4]
* Na3[Fe(CN)5NO]-3
* NH4[Co(SCN)4(H2O)2]
* [AuCl4]-1
[Cr(NH3)3(H2O)3] +3 → tri ammine tri aqua chromium (III) ion
[Co(en)2Cl2]NO3 → dichlorobisethylenediamine cobalt (III) nitrate
[Ni(CO)4] → tetracarbonylnickel(0)
Na3[Fe(CN)5NO] → sodiumpentacyanonitrosylferrate (II)
NH4[Co(SCN)4(H2O)2] → ammoniumdiaquatetra thiocyanocobaltate (III)
[AuCl4] → tetrachloroaurate (III) ion

(ix) Write I.U.P.A.C. names of **ANY FOUR** of the following:

* $H_2C=CH-C \equiv C-CH=CH_2$ * $(CH_3)_2CH.CO.CH_3$ * $CH_3.(CH_2)_2.CHO$
* $CH_2OH.CH_2.CH_2OH$ * $(C_6H_5)_3C.Br$ * $(CH_3O)_2CH-CH_2(OC_2H_5)$

ketone Aldehyde 1-but ...sene ...-lexyne

* $CH_2=CH-C \equiv C-CH=CH_2$

hex-1,5-diene-3-yne

* $CH_3-CH(CH_3)-C(=O)-CH_3$

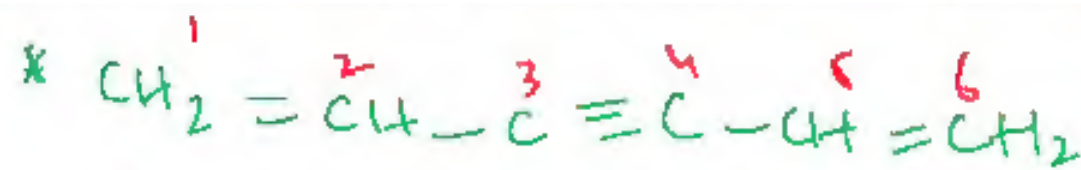
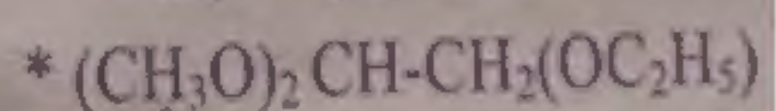
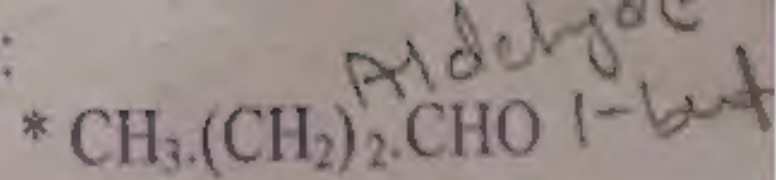
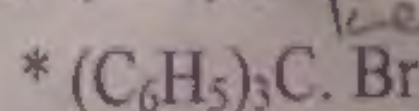
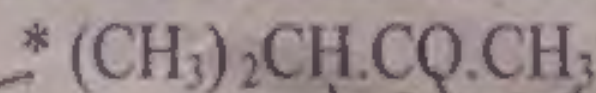
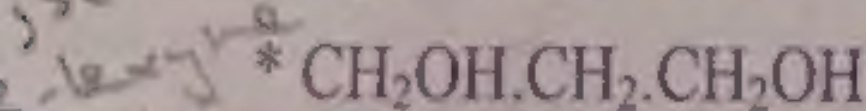
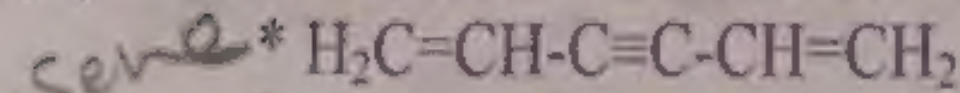
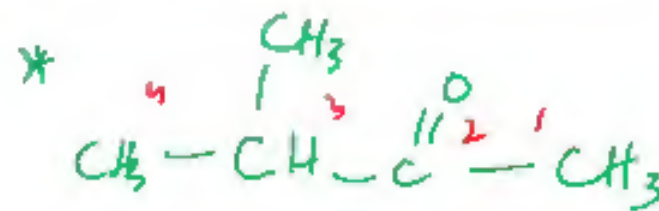
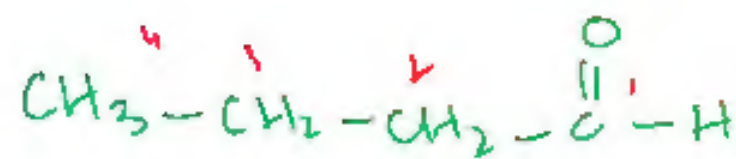
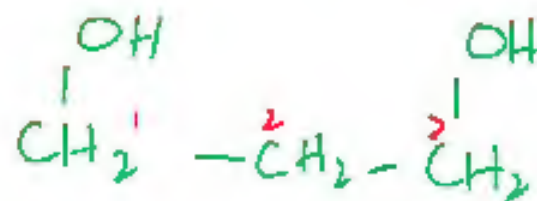
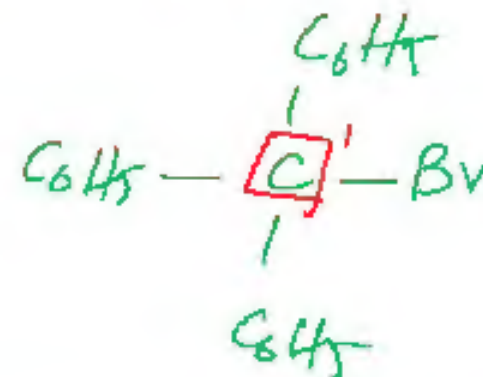
3-methylbutan-2-one

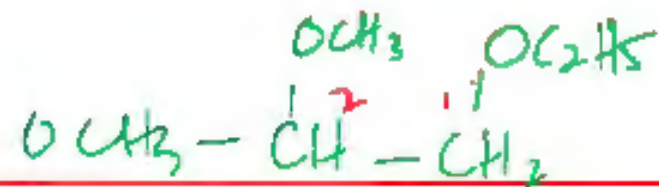
$CH_3-CH_2-CH_2-C(=O)-H$

butan-1-al

$CH_2(OH)-CH_2-CH_2(OH)$

propane-1,3-diol

$(C_6H_5)_3C-Br$

1-bromo-1,1,1-triphenyl methane

$OCH_3-CH(OCH_3)-CH_2(OC_2H_5)$

1-ethoxy-2,2-dimethoxy ethane

(b) Give the structures of **ANY FIVE** of the following:

* Catechol	* Nicotin amide	* Diphenyl acetylene
* Picric acid	* Valeric acid	* Iso-butyl alcohol
* Terephthalic acid	* Di-isopropyl ether	* α,β - dimethyl butyraldehyde

Explain the mechanism with the example of

* Catechol

* Picric Acid

* Terephthalic acid

* Valeric Acid

$CH_3-CH_2-CH_2-CH_2-\overset{O}{\overset{\|}{C}}-OH$

* di-isopropyl ether

$CH_3-\underset{}{\overset{CH_3}{\overset{|}{CH}}}-O-\overset{CH_3}{\overset{|}{CH}}-CH_3$

* diphenyl acetylene

$C_6H_5-C\equiv C-C_6H_5$

* isobutyl alcohol

$CH_3-\overset{CH_3}{\overset{|}{CH}}-CH_2-OH$

* α, β-dimethyl butyraldehyde

$CH_3-\underset{\beta}{\overset{CH_3}{\overset{|}{CH}}}-\underset{\alpha}{\overset{CH_3}{\overset{|}{CH}}}-\overset{O}{\overset{\|}{C}}-H$

Nicotin amide

(i) $2H_3C-\overset{\overset{O}{||}}{C}-OH \xrightarrow[500^{\circ}C]{MnO_2} CH_3-\overset{\overset{O}{||}}{C}-CH_3 + CO_2 + H_2O$

ch#9.

(iii) $H_3C-\overset{\overset{O}{||}}{C}-CH_3 + I_2 + Na_2CO_3 \longrightarrow CHI_3 + CH_3-\overset{\overset{O}{||}}{C}-ONa + NaI + CO_2 + H_2O$

(v) $2C_2H_5OH$ (Excess) $\xrightarrow{(H_2SO_4)\ Conc.} C_2H_5-O-C_2H_5 + H_2O$

thionyl chloride

(vii) $CH_3-\overset{\overset{O}{||}}{C}-OH + SOCl_2 \longrightarrow CH_3-\overset{\overset{O}{||}}{C}-Cl + SO_2 + HCl$.

(ii) H – C – H
Polymerization
metaformaldehyde
(iv) HC ≡ CH + H2O
H2SO4
HgSO4 (75°C)
CH3 – C – H
Best of luck!
(vi) H3C – C – Cl + NH3
CH3 – C – NH2 + HCl
Acetamide
Sir Nasim Zulfiqar
0300-2152272
whatsapp
(chem + english)
(viii) C2H5Cl + KSH
C2H5SH + KCl
(Dua-e-ilm)